

## THE JEWELERS OF MACHINING

John Maroney and son John Cameron

**B**ehind many successful U.S. exploits in space--from landing the first men on the moon to placing a roving robot vehicle on Mars in 1997--stands a small machining company in a Los Angeles suburb that produces parts so finely machined that some are thinner than a human hair. Maroney Co. of Northridge, Calif., combines the discipline of a science lab with the flair of an art studio to turn out some of the jewellike industrial parts shown on a later page.

This highly profitable company is run by the father-son duo of John Maroney and John Cameron, who uses his middle name as his last name so as not to be confused with his dad. The company employs just 17 people.

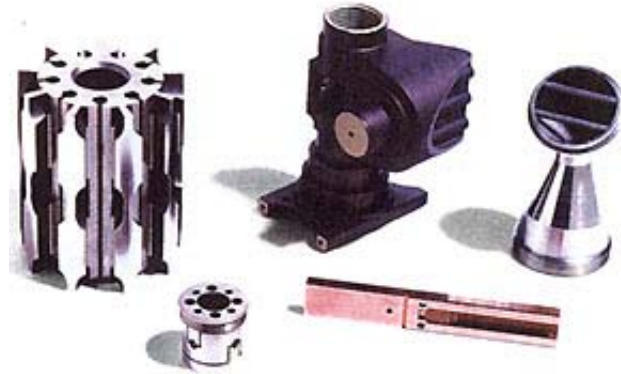


*That's CEO "Big John" Maroney behind the wheel of a racing pickup truck with his son John looking on. From time to time they sponsor a racing team.*

But most are highly skilled machinists, and it boasts an assortment of production machines that much larger outfits lack. One of Maroney Co.'s great strengths is the skillful use of electrical discharge machines (EDMs), which employ an electrode or fine wire electrically

heated to the brightness of a laser beam. EDMs can sculpt metal parts, both inside and outside, with a finesse and precision impossible with other types of machine tools.

While EDMs are widely employed to make dies and molds in industries producing everything from automobiles to watches, Maroney uses its EDMs and other machines on jobs that other shops can't tackle. An electrode shaped



*Maroney's Marvels, clockwise from left: a rotary die cylinder, a Mars surface scanner, a rocket nozzle, a wave-guide transformer, and a gyro suspension.*

like a tiny golf club, for example, can enter a drilled hole in a small block of metal to scoop out cavity of an unusual shape. An EDM wire machine might be used to drill tiny holes at seemingly impossible angles to meet the requirements of a scientific instrument.

The Maroney's are classic American geniuses. What led them to fine machining was an early love of much bigger machines, especially rough-road motorbikes and racing cars. John senior, 69, displayed a mechanical bent while growing up near Los Angeles, where he fixed clocks and other appliances for neighbors. In high school he spent most of his time in the machine shop. After dropping out, he went to work as a machinist at a small shop in Burbank. Later, in 1955, he set up his own shop with a hand-operated lathe that his former boss helped him buy for \$1,000. Maroney at first did jobs that other shops turned over to him. His luck changed when a salesman persuaded him to buy one of the first EDM machines.

The EDM process is unlike that of any other production machine. When its electrode or thin wire is heated by current, it gives off sparks that can carve a work piece in a desired manner by making tiny craters in the metal. The process takes place in the safe confines of deionized water or mineral oil, either of which can serve as an insulator.

The problem with early EDMs was that electrodes eroded as they worked on a piece---a process for which computer controls now compensate. In those days, adjusting for this erosion had to be done by hand. Moreover, it took the skill of a John Maroney to build electrodes out of copper, copper tungsten, or graphite in ways that anticipated their wear. His skill enabled his shop to outdo competitors.

That remarkable capability led TRW's aerospace division to select Maroney Co. as the sole supplier of the key sleeves and the fuel-metering mechanism for the descent engine of the Lunar Excursion Module (LEM) that landed astronauts on the moon. Maroney beat out 28 other EDM shops across the country for the contract, which put it into aerospace work in a big way. To

improve his EDM skills, Maroney spent several months at Swiss EDM makers in 1968.

The company has since participated in many other NASA and military aerospace programs. NASA's Jet Propulsion Lab in nearby Pasadena, for instance, turned to Maroney to build 235 minute parts for the Mars Pathfinder spacecraft that landed on the red planet in 1997 and deployed the *Sojourner* rover. Among other items, the Maroney shop machined crucial actuator gears used to reel in Pathfinder's deflated airbags. Made of especially tough steel, the gears were produced on two different types of EDMs, the only machines that can shape such heat-hardened materials. The Maroney shop has also been supplying parts for the Space Shuttle and the new International Space Station.

As son John Cameron, 48, likes to say, "The Maroney Co. has been to the moon and to Mars." But his shop is also doing a lot of work for earthbound applications, ranging from heart valves for people to parts for the robot hands and heads used in Disney theme parks' "Pirates of The Caribbean" exhibits. Maroney also makes parts for Panavision's silent-running movie cameras and metal sleeves through which Pfizer measures out doses of insulin powder. Other clients include companies that make radar, lasers, electricity-producing gas turbines, auto suspensions, and oil-well sensing devices. Not all these Maroney parts are tiny, but most have difficult-to-carve shapes and are made of unique materials such as beryllium copper, tungsten, titanium, and nickel incoel, a nickel-iron alloy.

These days Maroney is riding the crest of a wave toward greater miniaturization of consumer and industrial goods such as cell phones, medical devices, and parts for optical-fiber networks. The shop recently made the prototype of the world's smallest mass spectrometer, an instrument for identifying chemical compounds, for the Jet Propulsion Lab. It could serve as a handheld device in airports to detect drugs.

John Cameron, who is the elder Maroney son, became company president in 1996. His brother, Michael, 43, is the company lawyer. "Big John," as father Maroney is called, retains the title of CEO and still works at the company on his original hand-operated lathe, but he lets John run the company. Three of Big John's five golden retrievers, which accompany him everywhere, snooze near his lathe. He is an inveterate collector of cars. A high-domed building adjoining the company's spotless production facility is jam-packed with BMWs, a Hudson, a Porsche, Ford roadsters, and other older models, all of which Maroney hopes one day to fix. He owns 22 cars plus a big 1949 Ford truck, which he bought for \$3,000 when he saw it parked on his street.

Making machines work right has always been Maroney's passion. When a household appliance such as a vacuum cleaner would break down, Maroney would refuse to go out and buy a replacement, not because he couldn't afford it but because he felt that "you'd be buying the same problem again." He repaired such machines himself. He still drives pickup trucks hopped up to run on racetracks, known in the trade as "spec" trucks. From time to time he and son John sponsor a racing team.

John Cameron picked up machining skills as a youngster working as a janitor in his dad's shop. In high school and junior college, Cameron spent a lot of time racing dirt bikes. He was so good that at 17 he was selected to represent the U.S. abroad. He spent time in Czechoslovakia and later in Paris studying art, rejoining his dad's company in the 1990's.

For a family-owned shop, the company invests an unusually large amount of money in varied production equipment. Forty-nine production machines and 12 measuring devices can be found on the Maroney floor, including eight EDMs, as well as milling and grinding machines, lathes, and many other types. Says Cameron: "We like to control everything here under our own roof, from concept to conclusion."

Attracted by Maroney Co.'s reputation, top Swiss and Japanese EDM makers vie to place their latest machines on its shop floor. Similarly, the shop attracts skilled operators eager to do challenging jobs. It attracts plenty of customers too, despite its premium prices. Says John Maroney matter-of-factly; "If there isn't some challenge in a job, chances are you can get it done for less money someplace else." Customers seem to have no problem with that. Maroney Co. has never employed a salesman, but it gets more work that it can handle.

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